

Arabidopsis thaliana FAE1 (SEQ ID NO:2)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH LKVSVSKVMD
IFYQIRKADT SSRNVACDDP SSLDFLRKIQ ERSGLGDETY SPEGLIHVPP
RKTFAASREE TEKVIIGALE NLFENTKVNPN REIGILVVNS SMFNPTPSLS
AMVVNTFKLR SNIKSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
ENITQGIYAG ENRSMMVSNC LFRVGGAAIL LSNKSGDRRR SKYKLVHTVR
THTGADDKSF RCVQQEDDES GKIGVCLSKD ITNVAGTTLT KNIATLGPLI
LPLSEKFLFF ATFVAKKLLK DKIKHYYPVD FKLAVDHFCI HAGGRAVIDE
LEKNLGLSPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGKNAW
QIALGSGFKC NSAVWVALRN VKASANSPWQ HCIDRYPVKI DSDLSKSKTH
VQNGRS

Brassica napus elongase KCS (SEQ ID NO:4)

MTSINVKLLY HYVITNLFNL CFFPLTAIVA GKAYRLTIDD LHHLYYSYLO
HNLITIAPLF AFTVFGSVLYI IATRPKPVYL VEYSCYLPPT HCRSSISKVM
DIFYQVRKAD PSRNGTCDD SLDLFLRKIQ ERSGLGDETH GPEGLLQVPP
RKTFAAAREE TEQVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
ENITYNIYAG DNRSMVSNC LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
THTGADGKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
LPLSEKLLFF VTFMGKKLFF DKIKHYYPVD FKLAIHFCI HAGGRAVIDV
LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGKKNVW
QIALGSGFKC NSAVWVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
VQNGRS

B. napus elongase KCS (SEQ ID NO:6)

MTSINVKLLY HYVITNLFNL CFFPLTAIVA GKAYLTIDDL HHHLYYSYLO
NLITIAPLLA FTVFGLVLYI ATRPKPVYLV EYSCYLPPTH CRSSISKVMD
IFFQVRKADP SRNGTCDDSS WLDLFLRKIQE RSGLGDETHG PEGLLQVPPR
KTFARAREET EQVIIGALEN LFKNTNVNPK DIGILVVNSS MFNPTPSLSA
MVVNNTFKLRS NVRSFNLGGM GCSAGVIAID LAKDLLHVHK NTYALVVSTE
NITYNIYAGD NRSMMVSNCL FRVGGAAILL SNKPRDRRRS KYELVHTVRT
HTGADDKSFR CVQQGDDENG QTGVSLSKDI TDVAGRTVKK NIATLGPLIL
PLSEKLLFFV TFMGKKLFFD EIKHYYPVDF KLAIHFCIH AGGKAVIDVL
EKNLGLAPID VEASRSTLHR FGNTSSSSSIW YELAYIEPKG RMKKGKKNVWQ
IALGSGFKCN SAVWVALNNV KASTNSPWEH CIDRYPVKID SDSGKSETRV
PNGRS

FIGURE 1-1

At114 (SEQ ID NO:8)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
 NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH LKVSVSKVMD
 IFYQIRKADT SSRNGTCDDS SWLDFLRKIQ ERSGLGDETH GPEGLLQVPP
 RKTFAAAAREE TEQVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
 AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
 ENITYNIYAG DNRSMVSNCL LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
 THTGADGKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
 LPLSEKLLFF VTFMGKKLFF DKIKHYYPVD FKLAIDHFCI HAGGRAVIDV
 LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKGKGNKVW
 QIALGSGFKC NSAVWVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
 VPNGRS

At74 (SEQ ID NO:10)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
 NLITVTLLFA FTVFGLVLYI VTRPKPVYLV EYSCYLPPPH CRSSISKVMD
 IFYQVRKADP SRNGTCDDSS WLDLFLRKIQ RSGLGDETHG PEGLLQVPPR
 KTFAAAREET EQVIIGALEN LFKNTNVNPK DIGILVVNSS MFNPTPSLSA
 MVVNNTFKLRS NVRSFNLGGM GCSAGVIAID LAKDLLHVHK NTYALVVSTE
 NITYNIYAGD NRSMMVSNCL FRVGGAAILL SNKPGDRRRS KYELVHTVRT
 HTGADGKSFR CVQQGDDENG KIGVSLSKDI TDVAGRTVKK NIATLGPLIL
 PLSEKLLFFV TFMGKKLFD KIKHYYPDF KLAIHDFCIH AGGRAVIDVL
 EKNLALAPID VEASRSTLHR FGNTSSSSSIW YELAYIEAKG RMKGKGNKVWQ
 IALGSGFKCN SAVWVALNNV KASTNSPWEH CIDRYPVKID SDSGKSETRV
 QNGRS

At114 L91C K92R (SEQ ID NO:12)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
 NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH **CRVSVSKVMD**
 IFYQIRKADT SSRNGTCDNS SWLDFLRKIQ ERSGLGDETH GPEGLLQVPP
 RKTFAAAAREE TEQVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
 AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
 ENITYNIYAG DNRSMVSNCL LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
 THTGADGKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
 LPLSEKLLFF VTFMGKKLFF DKIKHYYPVD FKLAIDHFCI HAGGRAVIDV
 LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKGKGNKVW
 QIALGSGFKC NSAVWVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
 VPNGRS

FIGURE 1-2

At114 K92R (SEQ ID NO:14)

MTSVNVKLLY	RYVLTNFFNL	CLFPLTAFLA	GKASRLTIND	LHNFLSYLQH
NLITVTLLFA	FTVFGLVLYI	VTRPNPVYLV	DYSCYLPPPH	LRVSVSKVMD
IFYQIRKADT	SSRNGTCDDS	SWLDFLRKIQ	ERSGLGDETH	GPEGLLQVPP
RKTFAAAREE	TEQVIIGALE	NLFKNTNVNP	KDIGILVVNS	SMFNPTPSLS
AMVVNTFKLR	SNVRSFNLGG	MGCSAGVIAI	DLAKDLLHVH	KNTYALVVST
ENITYNIYAG	DNRSMMSVNC	LFRVGGAAIL	LSNKPGRDRR	SKYELVHTVR
THTGADGKSF	RCVQQGDDEN	GKIGVSLSKD	ITDVAGRTVK	KNIATLGPLI
LPLSEKLLFF	VTFMGKKLKF	DKIKHYVVPD	FKLAIDHFCI	HAGGRAVIDV
LEKNLALAPI	DVEASRSTLH	RFGNTSSSSI	WYELAYIEAK	GRMKKGKQVW
QIALGSGFKC	NSAVWVALNN	VKASTNSPWE	HCIDRYPVKI	DSDSGKSETR
VPNGRS				

At114 G307D (SEQ ID NO:16)

MTSVNVKLLY	RYVLTNFFNL	CLFPLTAFLA	GKASRLTIND	LHNFLSYLQH
NLITVTLLFA	FTVFGLVLYI	VTRPNPVYLV	DYSCYLPPPH	LKVSVSKVMD
IFYQIRKADT	SSRNGTCDDS	SWLDFLRKIQ	ERSGLGDETH	GPEGLLQVPP
RKTFAAAREE	TEQVIIGALE	NLFKNTNVNP	KDIGILVVNS	SMFNPTPSLS
AMVVNTFKLR	SNVRSFNLGG	MGCSAGVIAI	DLAKDLLHVH	KNTYALVVST
ENITYNIYAG	DNRSMMSVNC	LFRVGGAAIL	LSNKPGRDRR	SKYELVHTVR
THTGADDKSF	RCVQQGDDEN	GKIGVSLSKD	ITDVAGRTVK	KNIATLGPLI
LPLSEKLLFF	VTFMGKKLKF	DKIKHYVVPD	FKLAIDHFCI	HAGGRAVIDV
LEKNLALAPI	DVEASRSTLH	RFGNTSSSSI	WYELAYIEAK	GRMKKGKQVW
QIALGSGFKC	NSAVWVALNN	VKASTNSPWE	HCIDRYPVKI	DSDSGKSETR
VQNGRS				

At74 G306D (SEQ ID NO:18)

MTSVNVKLLY	RYVLTNFFNL	CLFPLTAFLA	GKASRLTIND	LHNFLSYLQH
NLITVTLLFA	FTVFGLVLYI	VTRPKPVYLV	EYSCYLPPTH	CRSSISKVMD
IFYQVRKADP	SRNGTCDDSS	WLDLFLRKIQ	RSGLGDETHG	PEGLLQVPPR
KTFAAAREET	EQVIIGALEN	LFKNTNVNPK	DIGILVVNSS	MFNPTPSLSA
MVVNTFKLRS	NVRSFNLGGM	GCSAGVIAID	LAKDLLHVHK	NTYALVVSTE
NITYNIYAGD	NRSMMVSNCL	FRVGGAAILL	SNKPGRDRRS	KYELVHTVRT
HTGADDKSFR	CVQQGDDENG	KIGVSLSKDI	TDVAGRTVKK	NIATLGPLIL
PLSEKLLFFV	TFMGKKLFKD	KIKHYVVPDF	KLAIDHFCIH	AGGRAVIDVL
EKNLALAPID	VEASRSTLHR	FGNTSSSSSIW	YELAYIEAKG	RMKKKGKQVWQ
IALGSGFKCN	SAVWVALNNV	KASTNSPWEH	CIDRYPVKID	SDSGKSETRV
QNGRS				

FIGURE 1-3

At114 L91C K92R G307D (SEQ ID NO:20)

MTSVNVKLLY	RYVLTNFFNL	CLFPLTAFLA	GKASRLTIND	LHNFLSYLQH
NLITVTLLFA	FTVFGLVLYI	VTRPNPVYLV	DYSCYLPPPH	CRVSVSKVMD
IFYQIRKADT	SSRNGTCDNS	SWLDFLRKIQ	ERSGLGDETH	GPEGLLQVPP
RKTFAAAREE	TEQVIIGALE	NLFKNTNVNP	KDIGILVVNS	SMFNPTPSLS
AMVVNTFKLR	SNVRSFNLGG	MGCSAGVIAI	DLAKDLLHVH	KNTYALVVST
ENITYNIYAG	DNRSMMSVNC	LFRVGGAAIL	LSNKPGRDRR	SKYELVHTVR
THTGADDKSF	RCVQQGDDEN	GKIGVSLSKD	ITDVAGRTVK	KNIATLGPLI
LPLSEKLLFF	VTFMGKKLFF	DKIKHYYPVD	FKLAIDHFCI	HAGGRAVIDV
LEKNLALAPI	DVEASRSTLH	RFGNTSSSSI	WYELAYIEAK	GRMKKGKQVW
QIALGSGFKC	NSAVWVALNN	VKASTNSPWE	HCIDRYPVKI	DSDSGKSETR
VQNGRS				

At114 K92R G307D (SEQ ID NO:22)

MTSVNVKLLY	RYVLTNFFNL	CLFPLTAFLA	GKASRLTIND	LHNFLSYLQH
NLITVTLLFA	FTVFGLVLYI	VTRPNPVYLV	DYSCYLPPPH	LRVSVSKVMD
IFYQIRKADT	SSRNGTCDNS	SWLDFLRKIQ	ERSGLGDETH	GPEGLLQVPP
RKTFAAAREE	TEQVIIGALE	NLFKNTNVNP	KDIGILVVNS	SMFNPTPSLS
AMVVNTFKLR	SNVRSFNLGG	MGCSAGVIAI	DLAKDLLHVH	KNTYALVVST
ENITYNIYAG	DNRSMMSVNC	LFRVGGAAIL	LSNKPGRDRR	SKYELVHTVR
THTGADDKSF	RCVQQGDDEN	GKIGVSLSKD	ITDVAGRTVK	KNIATLGPLI
LPLSEKLLFF	VTFMGKKLFF	DKIKHYYPVD	FKLAIDHFCI	HAGGRAVIDV
LEKNLALAPI	DVEASRSTLH	RFGNTSSSSI	WYELAYIEAK	GRMKKGKQVW
QIALGSGFKC	NSAVWVALNN	VKASTNSPWE	HCIDRYPVKI	DSDSGKSETR
VQNGRS				

At254 (SEQ ID NO:24)

MTSVNVKLLY	RYVLTNFFNL	CLFPLTAFLA	GKASRLTIND	LHNLLSYLQH
NLITVTLLFA	FTVFGLVLYI	VTRPNPVYLV	DYSCYLPPPH	LKVS V SKVMD
IFYQIRKADT	SSRNVACDDP	SSLDFLRKIQ	ERSGLGDETY	SPEGLIHVPP
RKTFAASREE	TEKVIIGALE	NLFENTKVNP	REIGILVVNS	SMFNPTPSLS
AMVVNTFKLR	SNIKSFNLGG	MGCSAGVIAI	DLAKDLLHVH	KNTYALVVST
ENITYNIYAG	DNRSMMSVNC	LFRVGGAAIL	LSNKPGRDRR	SKYELVHTVR
THTGADGKSF	RCVQQGDDEN	GKIGVSLSKD	ITDVAGRTVK	KNIATLGPLI
LPLSEKLLFF	VTFMGKKLFF	DKIKHYYPVD	FKLAIDHFCI	HAGGRAVIDV
LEKNLALAPI	DVEASRSTLH	RFGNTSSSSI	WYELAYIEAK	GRMKKGKQVW
QIALGSGFKC	NSAVWVALNN	VKASTNSPWE	HCIDRYPVKI	DSDSGKSETR
VPNGRS				

FIGURE 1-4

At173 (SEQ ID NO:26)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
 NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH LKVSVSKVMD
 IFYQIRKADT SSRNVACDDP SSLDFLRKIQ ERSGLGDETY SPEGLIHVPP
 RKTFAASREE TEKVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
 AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
 ENITYNIYAG DNRSMMSVNC LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
 THTGADGKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
 LPLSEKLLFF VTFMGKKLKF DKIKHYYPVP FKLAI DHFCI HAGGRAVIDV
 LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGKQVW
 QIALGSGFKC NSAVWVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
 VQNGRS

Bn176 (SEQ ID NO:28)

MTSINVKLLY HYVITNLFNL CFFPLTAIVA GKAYRLTIDD LHHLYYSYLO
 HNLITIAPLF AFTVFGSVLY IATRPKPVYL VEYSCYLPPT HCRSSISKVM
 DIFYQVRKAD PSRNGTCDDS SWLDFLRKIQ ERSGLGDETH GPEGLLQVPP
 RKTFAAAREE TEQVIIGALE NLFKNTKVNPN REIGILVVNS SMFNPTPSLS
 AMVVNTFKLR SNIKSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
 ENITQGIYAG ENRSMMSVNC LFRVGGAAIL LSNKSGDRRR SKYKLVHTVR
 THTGADDKSF RCVQQEDDES GKIGVCLSKD ITNVAGTTLT KNIATLGPLI
 LPLSEKFLFF ATFVAKKLLK DKIKHYYPVP FKLAVDHFCI HAGGRAVIDE
 LEKNLGLSPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGKQAW
 QIALGSGFKC NSAVWVALRN VKASANSWPQ HCIDRYPVKI DSDLKSKTH
 VQNGRS

At399 (SEQ ID NO:30)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
 NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH LKVSVSKVMD
 IFYQIRKADT SSRNVACDDP SSLDFLRKIQ ERSGLGDETY SPEGLIHVPP
 RKTFAASREE TEKVIIGALE NLFENTKVNPN REIGILVVNS SMFNPTPSLS
 AMVVNTFKLR SNIKSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
 ENITQGIYAG ENRSMMSVNC LFRVGGAAIL LSNKSGDRRR SKYKLVHTVR
 THTGADDKSF RCVQQEDDES GKIGVCLSKD ITNVAGTTLT KNIATLGPLI
 LPLSEKFLFF ATFVAKKLLK DKIKHYYPVP FKLAVDHFCI HAGGRAVIDV
 LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGKQVW
 QIALGSGFKC NSAVWVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
 VQNGRS

FIGURE 1-5

Bn399 (SEQ ID NO:32)

MTSINVKLLY HYVITNLFNL CFFPLTAIVA GKAYRLTIDD LHHLYYSYLO
HNLITIAPLF AFTVFGSVLY IATRPKPVYL VEYSCYLPPT HCRSSISKVM
DIFYQVRKAD PSRNGTCDDS SWLDFLRKIQ ERSGLGDETH GPEGLLQVPP
RKTFAAAREE TEQVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
ENITYNIYAG DNRSMMSVNC LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
THTGADGKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
LPLSEKLLFF VTFMGKKLKF DKIKHYYPV FKLAI DHFCI HAGGRAVIDE
LEKNLGLSPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGKNKAW
QIALGSGFKC NSAVWVALRN VKASANS PWQ HCIDRYPVKI DSDL SKSKTH
VQNGRS

Bn G307D (SEQ ID NO:34)

MTSINVKLLY HYVITNLFNL CFFPLTAIVA GKAYRLTIDD LHHLYYSYLO
HNLITIAPLF AFTVFGSVLY IATRPKPVYL VEYSCYLPPT HCRSSISKVM
DIFYQVRKAD PSRNGTCDDS SWLDFLRKIQ ERSGLGDETH GPEGLLQVPP
RKTFAAAREE TEQVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
ENITYNIYAG DNRSMMSVNC LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
THTGADDKSF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
LPLSEKLLFF VTFMGKKLKF DKIKHYYPV FKLAI DHFCI HAGGRAVIDV
LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGKNKVW
QIALGSGFKC NSAVWVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
VQNGRS

At K92R (SEQ ID NO:36)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLP PPH LRVSVSKVMD
IFYQIRKADT SSRNVACDDP SSLDFLRKIQ ERSGLGDETY SPEGLIHVPP
RKTFAASREE TEKVIIGALE NLFENTKVNP REIGILVVNS SMFNPTPSLS
AMVVNTFKLR SNIKSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
ENITQGIYAG ENRSMMSVNC LFRVGGAAIL LSNKSGDRRR SKYKLVHTVR
THTGADDKSF RCVQQEDDES GKIGVCLSKD ITNVAGTTLT KNIATLGPLI
LPLSEKFLFF ATFVAKKLLK DKIKHYYPV FKLAV DHFCI HAGGRAVIDE
LEKNLGLSPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRMKKGKNKAW
QIALGSGFKC NSAVWVALRN VKASANS PWQ HCIDRYPVKI DSDL SKSKTH
VQNGRS

FIGURE 1-6

At254 G307D (SEQ ID NO:38)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
 NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH LKVSVSKVMD
 IFYQIRKADT SSRNVACDDP SSLDFLRKIQ ERSGLGDETY SPEGLIHVPP
 RKTFAASREE TEKVIIGALE NLFENTKVNP REIGILVVNS SMFNPTPSLS
 AMVVNTFKLR SNIKSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
 ENITYNIYAG DNRSMMVSNC LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
 THTGAD~~DK~~SF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
 LPLSEKLLFF VTFMGKKLKF D~~K~~IKHYYPV FKL~~AIDH~~FCI HAGGRAVIDV
 LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRM~~KKGN~~KVW
 QIALGSGFKC NSAVWVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
 VQNGRS

At173 G307D (SEQ ID NO:40)

MTSVNVKLLY RYVLTNFFNL CLFPLTAFLA GKASRLTIND LHNFLSYLQH
 NLITVTLLFA FTVFGLVLYI VTRPNPVYLV DYSCYLPPPH LKVSVSKVMD
 IFYQIRKADT SSRNVACDDP SSLDFLRKIQ ERSGLGDETY SPEGLIHVPP
 RKTFAASREE TEKVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
 AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
 ENITYNIYAG DNRSMMVSNC LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
 THTGAD~~DK~~SF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
 LPLSEKLLFF VTFMGKKLKF D~~K~~IKHYYPV FKL~~AIDH~~FCI HAGGRAVIDV
 LEKNLALAPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRM~~KKGN~~KVW
 QIALGSGFKC NSAVWVALNN VKASTNSPWE HCIDRYPVKI DSDSGKSETR
 VQNGRS

Bn399 G307D (SEQ ID NO:42)

MTSINVKLLY HYVITNLFNL CFFPLTAIVA GKAYRLTIDD LHHLYYSYLQ
 HNLITIAPLF AFTVFGSVLY IATRPKPVYL VEYSCYLPPT HCRSSISKVM
 DIFYQVRKAD PSRNGTCDD S~~W~~LDFLRKIQ ERSGLGDETH GPEGLLQVPP
 RKTFAAAAREE TEQVIIGALE NLFKNTNVNP KDIGILVVNS SMFNPTPSLS
 AMVVNTFKLR SNVRSFNLGG MGCSAGVIAI DLAKDLLHVH KNTYALVVST
 ENITYNIYAG DNRSMMVSNC LFRVGGAAIL LSNKPGDRRR SKYELVHTVR
 THTGAD~~DK~~SF RCVQQGDDEN GKIGVSLSKD ITDVAGRTVK KNIATLGPLI
 LPLSEKLLFF VTFMGKKLKF D~~K~~IKHYYPV FKL~~AIDH~~FCI HAGGRAVIDE
 LEKNLGLSPI DVEASRSTLH RFGNTSSSSI WYELAYIEAK GRM~~KKGN~~KAW
 QIALGSGFKC NSAVWVALRN VKASANS~~P~~WQ HCIDRYPVKI DSDLSKSKTH
 VQNGRS

FIGURE 1-7

Arabidopsis thaliana FAE1 (SEQ ID NO:1)

atgacgtccg ttaacgttaa gctcctttac cgttacgtct taaccaactt
tttcaacctc tgtttggtcc cgttaacggc gttcctcgcc ggaaaagcct
ctcggcttac cataaacgat ctccacaact tcctttccta tctccaacac
aaccttataa cagtaacttt actctttgct ttcactgttt tcggtttggt
tctctacatc gtaacccgac ccaatccggt ttatctcggt gactactcgt
gttaccttcc accaccgcat ctcaaagtta gtgtctctaa agtcatggat
attttctacc aaataagaaa agctgatact tcttcacgga acgtggcatg
tgatgatccg tcctcgctcg atttcctgag gaagattcaa gagcggttcag
gtctaggtga tgagacgtac agtcctgagg gactcattca cgtaccaccg
cggagactt ttgcagcgtc acgtgaagag acagagaagg ttatcatcgg
tgcgctcgaa aatctattcg agaacaccaa agttaaccct agagagattg
gtatacttgt ggtgaactca agcatgttta atccaactcc ttcgctatcc
gctatggctg ttaatacttt caagctccga agcaacatca aaagctttaa
tctaggagga atgggttgta gtgctggtgt tattgccatt gatttggtta
aagacttggt gcatgttcat aaaaacactt atgctcttgt ggtgagcact
gagaacatca cacaaggcat ttatgctgga gaaaatagat caatgatggt
tagcaattgc ttgtttcgtg ttggtggggc cgcgattttg ctctctaaca
agtcggggaga ccggagacgg tccaagtaca agctagtcca cacgggtccga
acgcatactg gagctgatga caagtctttt cgatgtgtgc aacaagaaga
cgatgagagc ggcaaaatcg gagtttgtct gtcaaaggac ataaccaatg
ttgcggggac aacacttacg aaaaatatag caacattggg tccgttgatt
cttcctttaa gcgaaaagtt tctttttttc gctaccttcg tcgccaagaa
acttctaaag gataaaatca agcattacta tgttcgggat ttcaagcttg
ctgttgacca tttctgtatt catgccggag gcagagccgt gatcgatgag
ctagagaaga acttaggact atcgccgacg gatgtggagg catctagatc
aacgttacat agatttgga atacttcacg tagctcaatt tggatatgaat
tagcatacat agaggcaaag ggaagaatga agaaaggga taaagcttgg
cagattgctt taggatcagg gtttaagtgt aatagtgcgg tttgggtggc
tctacgcaat gtcaaggcat cggcaaatag tccttggaac cattgcacg
atagatatcc gggtaaaatt gattctgatt tgtcaaagtc aaagactcat
gtccaaaacg gtcggtccta atttgatgta tctgagtgcc aacgtttact
ttgtctttcc tttcttttat tggttatgaa ttagatgttt actaatgttc
ctctcttttt cgttataaat aaagaagttc aattcttcct atagtttcaa
acgcgatttt aagcgtttct atttaggttt acatgaattt cttttacaaa
ccatctttt

FIGURE 2-1

Brassica napus elongase KCS (SEQ ID NO:3)

```

atgacgtcca ttaacgtaaa gtccttttac cattacgtca taaccaacct
tttcaacctt tgcttctttc cgttaacggc gatcgtcgcc ggaaaagcct
atcggccttac catagacgat cttcaccact tatactattc ctatctccaa
cacaacctca taaccatcgc tccactcttt gccttcaccg ttttcggttc
ggttctctac atcgcaaccc ggcccaaacc ggtttacctc gttgagtact
catgctacct tccaccaacg cattgtagat caagtatctc caaggctcatg
gatatctttt atcaagtaag aaaagctgat ccttctcgga acggcacgtg
cgatgactcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
gtctaggcga tgaaactcac gggcccgagg ggctgcttca ggtccctccc
cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
tgcgctagaa aatctattca agaacaccaa cgttaaccct aaagatatag
gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
gcgatggtcg ttaacacttt caagctccga agcaacgtaa gaagctttaa
ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
aggacttggt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
gagaacatca cttataacat ttacgctggt gataataggt ccatgatggt
ttcaaattgc ttgttccgtg ttggtggggc cgctattttg ctctccaaca
agcctggaga tcgtagacgg tccaagtacg agctagttca cacggttcga
acgcataccg gagctgacgg caagtctttt cgttgcgtgc aacaaggaga
cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
ttgctggtcg aacggttaag aaaaacatag caacgttggg tccgttgatt
cttccgttaa gcgagaaact tctttttttc gttaccttca tgggcaagaa
acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
aacgttacat agatttgga acacttcac tagctcaata tggatgagt
tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttgg
cagattgctt tagggtcagg ctttaagtgt aacagtgcag tttgggtggc
tctaaacaat gtcaaagctt cgacaaatag tccttgggaa cactgcatcg
acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
gtccaaaacg gtcggtccta ataa

```

FIGURE 2-2

B. napus elongase KCS (SEQ ID NO:5)

tagagcgtaa	cggaccacaa	aagaggatcc	atacaaatac	atctcatcgc
ttccattact	attctccgac	acacacactg	agcaatgacg	tccattaacg
taaagctcct	ttaccattac	gtcataacca	accttttcaa	cctttgtttc
tttccattaa	cggcgatcgt	cgccggaaaa	gcctatctta	ccatagacga
tcttcaccac	ttatactatt	cctatctcca	acacaacctc	ataaccattg
ctccactcct	ggccttcacc	gttttcggtt	cggttctcta	catcgcaacc
cggcccaaac	cggtttacct	cgtggagtac	tcattgctacc	ttccaccaac
gcattgtaga	tcaagtatct	ccaaggtcat	ggatatcttt	ttccaagtaa
gaaaagctga	tccttctcgg	aacggcacgt	gcgatgactc	gtcctggcct
gacttcttga	ggaagattca	agaacgttca	ggtctaggcg	atgaaaccca
cgggcccagag	gggctgcttc	aggtccctcc	ccggaagact	tttgcgcgcg
cgcgtaaga	gacggagcaa	gttatcattg	gtgcgctaga	aaatctattc
aagaacacca	atgttaaccc	taaagatata	ggtatacttg	tggatgaactc
aagcatgttt	aatccaactc	cttcgctctc	cgcgatggtc	gttaacactt
tcaagctccg	aagcaacgta	agaagcttta	accttggtgg	catgggttgt
agtgccggcg	ttatagccat	tgatctagca	aaggacttgt	tgcattgtcca
taaaaatacg	tatgctcttg	tggatgagcac	agagaacatc	acttataaca
tttacgctgg	tgataatagg	tccatgatgg	tttcaaattg	cttggtccgt
gttggtgggg	ccgctatttt	gctctccaac	aagcctagag	atcgtagacg
gtccaagtac	gagctagttc	acacgggttcg	aacgcatacc	ggagctgacg
acaagtcttt	tcgttgcggtg	caacaaggag	acgatgagaa	cggccaaacc
ggagtgaagt	tgtccaagga	cataaccgat	gttgctggtc	gaacggttaa
gaaaaacata	gcaacgctgg	gtccggtgat	tcttccgtta	agcgagaaac
ttcttttttt	cgttaccttc	atgggcaaga	aacttttcaa	agacgaaatc
aaacattatt	acgtcccggg	cttcaagctt	gctatcgacc	atttttgtat
acatgccgga	ggcaaagccg	tgattgatgt	gctagagaag	aacctaggcc
tagcaccgat	cgatgtagag	gcatacaagt	caacggtaca	tagatttgga
aacacttcat	ctagctcaat	atgggtatgag	ttggcataca	tagaacccaa
aggaaggatg	aagaaaggta	ataaagtttg	gcagattgct	ttagggtcag
gctttaagtg	taacagtgca	gtttgggtgg	ctctaaacaa	tgtcaaagct
tcaacaaata	gtccttggga	acactgcatc	gacagatacc	cgggttaaat
tgattctgat	tcaggtaagt	cagagactcg	tgtcccaaac	ggtcggtcct
aataaatgat	gtttgctctc	tttcgtttct	ttttattggt	tataataatt
tgatggccac	gatgtttctc	ttgtttgtta	tgaataaaga	atcccacggt
gttctagtaa	aaaaaaaaa	aaaaaaaaa	aaaaaa	

FIGURE 2-3

At114 (SEQ ID NO:7)

atgacgtccg ttaacgttaa gtccttttac cgttatgtct taaccaactt
 tttcaacctc tgtttgttcc cgtaaacggc gttcctcgcc ggaaaagcct
 ctgggcttac cataaacgat ctccacaact tcctttccta tctccaacac
 aaccttataa cagtaacttt actctttgct ttcactgttt tcggtttggt
 tctctacatc gtaaccggac ccaatccggt ttatctcggt gactactcgt
 gttaccttcc gccaccgcat ctcaaagtta gtgtctctaa agtcatggat
 attttctacc aaataagaaa agctgatact tcttcacgga acggcacgtg
 tgatgattcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
 gtctaggcga tgaaactcac gggcccagag ggctgcttca ggtccctccc
 cggaagactt ttgcgggcgc gcgtgaagag acggagcaag ttatcattgg
 tgcgctagaa aatctattca agaacaccaa cgtaaacctt aaagatatag
 gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
 gcgatggtcg ttaacacttt caagctccga agcaacgtaa gaagctttaa
 ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
 aggacttggt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
 gagaacatca cttataacat ttacgctggt gataataggt ccatgatggg
 ttcaaattgc ttgttccgtg ttggtggggc cgctattttg ctctccaaca
 agcctggaga tcgtagacgg tccaagtacg agctagttca cacggttcga
 acgcataccg gagctgacgg caagtctttt cgttgcgtgc aacaaggaga
 cgatgagaac ggcaaaatcg gagtgaagtt gtccaaggac ataaccgatg
 ttgctggtcg aacggttaag aaaaacatag caacgttggg tccgttgatt
 cttccgttaa gcgagaaact tctttttttc gttaccttca tgggcaagaa
 acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
 ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
 ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
 aacgttacat agatttgga acacttcac tagctcaata tggatgagt
 tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttg
 cagattgctt tagggtcagg ctttaagtgt aacagtgcag tttgggtggc
 tctaaacaat gtcaaagctt cgacaaatag tccttgggaa cactgcacgc
 acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
 gtcccaaacc gtcggtccta a

FIGURE 2-4

At74 (SEQ ID NO:9)

atgacgtccg ttaacgttaa gtccttttac cgttacgtct taaccaactt
 tttcaacctc tgtttggtcc cgtaacggc gttcctcgcc ggaaaagcct
 ctgggcttac cataaacgat ctccacaact tcctttccta tctccaacac
 aaccttataa cagtaacttt actctttgct ttcactgttt tcggtttggt
 tctctacatc gtaacccgac ccaaaccggt ttacctcggt gagtactcat
 gctaccttcc accaacgcat tgtagatcaa gtatctccaa ggtcatggat
 atcttttatc aagtaagaaa agctgaccc tctcggaacg gcacgtgcga
 tgactcgctc tggcttgact tcttgaggaa gattcaagaa cgttcaggct
 taggcgatga aactcacggg cccgaggggc tgcttcagggt cctcccccgg
 aagacttttg cggcggcgcg tgaagagacg gagcaagtta tcattgggtgc
 gctagaaaat ctattcaaga acaccaacgt taaccctaaa gatataggta
 tacttggtgg gaactcaagc atgtttaatc caactccatc gctctccgcy
 atgggtcgta acactttcaa gctccgaagc aacgtaagaa gctttaacct
 tgggtggcatg ggttgtagtg ccggcggtat agccattgat ctagcaaagg
 acttggtgca tgtccataaa aatacgtatg ctcttggtgg gagcacagag
 aacatcactt ataacattta cgctggtgat aataggtcca tgatgggttc
 aaattgcttg ttccgtggtg gtggggccgc tattttgctc tccaacaagc
 ctggagatcg tagacgggcc aagtacgagc tagttcacac ggttcgaacg
 cataccggag ctgacggcaa gtcttttctg tgcgtgcaac aaggagacga
 tgagaacggc aaaatcggag tgagtttggt caaggacata accgatgttg
 ctgggtcgaac ggttaagaaa aacatagcaa cggtgggtcc gttgattctt
 ccgttaagcg agaaacttct ttttttctgt accttcattg gcaagaaact
 tttcaaagat aaaatcaaac attactacgt cccggatttc aaacttgcta
 ttgaccattt ttgtatacat gccggaggca gagccgtgat tgatgtgcta
 gagaagaacc tagccctagc accgatcgat gtagaggcat caagatcaac
 gttacataga tttggaaaca cttcatctag ctcaatatgg tatgagttgg
 catacataga agcaaaaagga aggatgaaga aaggtaataa agtttggcag
 attgcttttag ggtcaggctt taagtgtaac agtgcagttt ggggtggctct
 aaacaatgtc aaagcttcga caaatagtc ttgggaacac tgcacgcaca
 gataccgggt caaaattgat tctgattcag gtaagtcaga gactcgtgtc
 caaaacggtc ggtcctaa

FIGURE 2-5

At114 L91C K92R (SEQ ID NO:11)

atgacgtccg ttaacgttaa gtccttttac cgttatgtct taaccaactt
 tttcaacctc tgtttggtcc cgtaaaccgc gttcctcgcc ggaaaagcct
 ctcggcttac cataaacgat ctccacaact tcctttccta tctccaacac
 aaccttataa cagtaacttt actctttgct ttcactgttt tcggtttggt
 tctctacatc gtaacccgac ccaatccggt ttatctcggt gactactcgt
 gttaccttcc gccaccgcat **tgacagag**gtta gtgtctctaa agtcatggat
 attttctacc aaataagaaa agctgatact tcttcacgga acggcacgtg
 tgataattcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
 gtctaggcga tgaaactcac gggcccgagg ggctgcttca ggtccctccc
 cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
 tgcgctagaa aatctattca agaaccacaa cgttaaccct aaagatatag
 gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
 gcgatggtcg ttaacacttt caagctccga agcaacgtaa gaagctttaa
 ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
 aggacttggt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
 gagaacatca cttataacat ttacgctggt gataataggt ccatgatggt
 ttcaaattgc ttgttccgtg ttggtggggc cgctattttg ctctccaaca
 agcctggaga tcgtagacgg tccaagtacg agctagtcca cacgggtcga
 acgcataccg gagctgacgg caagtctttt cgttgcgtgc aacaaggaga
 cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
 ttgctggtcg aacgggttaag aaaaacatag caacgttggg tccgttgatt
 cttccgttaa gcgagaaaact tctttttttc gttaccttca tgggcaagaa
 acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
 ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
 ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
 aacgttacat agatttgga acacttcac tagctcaata tgggatgagt
 tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtgttg
 cagattgctt tagggtcagg ctttaagtgt aacagtgcag tttgggtggc
 tctaaacaat gtcaaagctt cgacaaatag tccttgggaa cactgcatcg
 acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
 gtcccaaacc gtccgtccta a

FIGURE 2-6

At114 K92R (SEQ ID NO:13)

atgacgtccg ttaacgttaa gctcctttac cgttatgtct taaccaactt
 tttcaacctc tgtttggtcc cgtaaacggc gttcctcgcc ggaaaagcct
 ctgggcttac cataaacgat ctccacaact tcctttccta tctccaacac
 aaccttataa cagtaacttt actccttgct ttcactgttt tcggtttggt
 tctctacatc gtaacccgac ccaatccggg ttatctcggt gactactcgt
 gttaccttcc gccaccgcat ct**agag**gtta gtgtctctaa agtcatggat
 attttctacc aaataagaaa agctgatact tcttcacgga acggcacgtg
 tgatgattcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
 gtctaggcga tgaaactcac gggcccgagg ggctgcttca ggtccctccc
 cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
 tgcgctagaa aatctattca agaacaccaa cgtaaacctt aaagatatag
 gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
 gcgatggctg ttaacacttt caagctccga agcaacgtaa gaagctttaa
 ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
 aggacttggt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
 gagaacatca cttataacat ttacgctggg gataataggt ccatgatggt
 ttcaaattgc ttgttccgtg ttgggtgggg cgctattttg ctctccaaca
 agcctggaga tcgtagacgg tccaagtacg agctagtcca cacggttcga
 acgcataccg gagctgacgg caagtctttt cgttgcgtgc aacaaggaga
 cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
 ttgctggctg aacgggttaag aaaaacatag caacggtggg tccgttgatt
 cttccgttaa gcgagaaaact tctttttttc gttaccttca tgggcaagaa
 acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
 ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
 ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
 aacgttacat agatttgga acacttcatc tagctcaata tggatatgagt
 tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttgg
 cagattgctt tagggtcagg ctttaagtgt aacagtgcag tttgggtggc
 tctaaacaat gtcaaaagct cgacaaatag tccttgggaa cactgcatcg
 acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
 gtcccaaacg gtcggtccta a

FIGURE 2-7

At114 G307D (SEQ ID NO:15)

atgacgtccg ttaacgttaa gtccttttac cgttatgtct taaccaactt
 tttcaacctc tgtttggtcc cgtaaaccgc gttcctcgcc ggaaaagcct
 ctcgggttac cataaacgat ctccacaact tcctttccta tctccaacac
 aaccttataa cagtaacttt actctttgct ttcactgttt tcggtttggt
 tctctacatc gtaaccgcac ccaatccggt ttatctcggt gactactcgt
 gttaccttcc gccaccgcat ctcaaagtta gtgtctctaa agtcatggat
 attttctacc aaataagaaa agctgatact tcttcacgga acggcacgtg
 tgatgattcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
 gtctaggcga tgaaactcac gggcccgagg ggctgcttca ggtccctccc
 cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
 tgcgctagaa aatctattca agaaccacaa cgttaaccct aaagatatag
 gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
 gcgatggctg ttaacacttt caagctccga agcaacgtaa gaagctttaa
 ccttggtggc atgggttgta gtgcggcgt tatagccatt gatctagcaa
 aggacttggt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
 gagaacatca cttataacat ttacgctggg gataataggc ccatgatggg
 ttcaaattgc ttgttccgtg ttgggtgggg cgctattttg ctctccaaca
 agcctggaga tcgtagacgg tccaagtacg agctagttca cacgggttcga
 acgcataccg gagctgacga **ca**agtcctttt cgttgcgtgc aacaaggaga
 cgatgagaac ggcaaaatcg gaggtagttt gtccaaggac ataaccgatg
 ttgctggctg aacgggttaag aaaaacatag caacgttggg tccgttgatt
 cttccgttaa gcgagaaact tctttttttc gttaccttca tgggcaagaa
 acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
 ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
 ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
 aacgttacat agatttgga acacttcac tagctcaata tgggtatgagt
 tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtgttg
 cagattgctt tagggtcagg cttaagtgt aacagtgcag tttgggtggc
 tctaaacaat gtcaaagctt cgacaaatag tccttgggaa cactgcacgc
 acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
 gtccaaaacg gtcggtccta a

FIGURE 2-8

At74 G306D (SEQ ID NO:17)

```

atgacgtccg ttaacgttaa gtccttttac cgttacgtct taaccaactt
tttcaacctc tgtttggtcc cgtaaacggc gttcctcgcc ggaaaagcct
ctcgggttac cataaacgat ctccacaact tcctttccta tctccaacac
aaccttataa cagtaacttt actctttgct ttcactgttt tcggtttggt
tctctacatc gtaacccgac ccaaaccggt ttacctcggt gagtactcat
gctaccttcc accaacgcat tgtagatcaa gtatctccaa ggtcatggat
atcttttatc aagtaagaaa agctgaccc tctcggaacg gcacgtgcga
tgactcgctg tggcttgact tcttgaggaa gattcaagaa cgttcaggtc
taggcgatga aactcacggg cccgaggggc tgcttcagggt cctccccggg
aagacttttg cggcggcgcg tgaagagacg gagcaagtta tcattgggtgc
gctagaaaat ctattcaaga acaccaacgt taaccctaaa gatataggta
tacttggtgt gaactcaagc atgtttaatc caactccatc gctctccgcg
atggtcgtta acactttcaa gctccgaagc aacgtaagaa gctttaacct
tggtggcatg ggttgtagtg cggcggttat agccattgat ctagcaaagg
acttgttgca tgtccataaa aatacgtatg ctcttggtgt gagcacagag
aacatcactt ataacattta cgctgggtgat aataggtcca tgatggtttc
aaattgcttg ttccgtggtg gtggggccgc tattttgctc tccaacaagc
ctggagatcg tagacgggtc aagtacgagc tagttcacac ggttcgaacg
cataccggag ctgacgacaa gtcttttcgt tgcgtgcaac aaggagacga
tgagaacggc aaaatcggag tgagtttgct caaggacata accgatgttg
ctggtcgaac ggttaagaaa aacatagcaa cgttgggtcc gttgattctt
ccgttaagcg agaaacttct ttttttcgtt accttcattg gcaagaaact
tttcaaagat aaaatcaaac attactacgt cccggatttc aaacttgcta
ttgaccattt ttgtatacat gccggaggca gagccgtgat tgatgtgcta
gagaagaacc tagccctagc accgatcgat gtagaggcat caagatcaac
gttacataga tttggaaaca cttcatctag ctcaatatgg tatgagttgg
catacataga agcaaaagga aggatgaaga aaggtaataa agtttggcag
attgcttttag ggtcaggctt taagtgtaac agtgcagttt ggggtggctct
aaacaatgtc aaagcttcga caaatagtc ttgggaacac tgcacgcaca
gatacccggt caaaattgat tctgattcag gtaagtcaga gactcgtgtc
caaacgggtc ggtcctaa

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FIGURE 2-9

At114 L91C K92R G307D (SEQ ID NO:19)

atgacgtccg ttaacgttaa gctcctttac cgttatgtct taaccaactt
 tttcaacctc tgtttggtcc cgtaaacggc gttcctcgcc ggaaaagcct
 ctgggcttac cataaacgat ctccacaact tcctttccta tctccaacac
 aaccttataa cagtaacttt actccttgct tteactgttt tcggtttggt
 tctctacatc gtaacccgac ccaatccggt ttatctcggt gactactcgt
 gttaccttcc gccaccgcat **tgacagag**gtta gtgtctctaa agtcatggat
 attttctacc aaataagaaa agctgatact tcttcacgga acggcacgtg
 tgataattcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
 gtctaggcga tgaaactcac gggcccgagg ggctgcttca ggtccctccc
 cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
 tgcgctagaa aatctattca agaacaccaa cgtaaacctt aaagatatag
 gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
 gcgatggctg ttaacacttt caagctccga agcaacgtaa gaagctttaa
 ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
 aggacttgtt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
 gagaacatca cttataacat ttacgctggt gataataggt ccatgatggt
 ttcaaattgc ttgttccgtg ttggtggggc cgctattttg ctctccaaca
 agcctggaga tcgtagacgg tccaagtacg agctagtcca cacggttcga
 acgcataccg gagctgacga **ca**agtcctttt cgttgctgctc aacaaggaga
 cgatgagaac ggcaaaatcg gagtgaagttt gtccaaggac ataaccgatg
 ttgctggctg aacgggttaag aaaaacatag caacggtggg tccgttgatt
 cttccgttaa gcgagaaact tctttttttc gttaccttca tgggcaagaa
 acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
 ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
 ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
 aacggtacat agatttgtaa acacttcacg tagctcaata tggatatgagt
 tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttgg
 cagattgctt tagggtcagg ctttaagtgt aacagtgcag tttgggtggc
 tctaaacaat gtcaaagctt cgacaaatag tccttgggaa cactgcatcg
 acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
 gtccaaaacg gtcggtccta a

FIGURE 2-10

At114 K92R G307D (SEQ ID NO:21)

atgacgtccg ttaacgttaa gtccttttac cgttatgtct taaccaactt
 tttcaacctc tgtttggtcc cgtaacggc gttcctcgcc ggaaaagcct
 ctcggttac cataaacgat ctccacaact tcctttccta tctccaacac
 aaccttataa cagtaacttt actctttgct ttcactgttt tcggtttggt
 tctctacatc gtaaccgac ccaatccggt ttatctcggt gactactcgt
 gttaccttcc gccaccgcat ct**agag**gtta gtgtctctaa agtcatggat
 attttctacc aaataagaaa agctgatact tcttcacgga acggcacgtg
 tgatgattcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
 gtctaggcga tgaaactcac gggcccgagg ggctgcttca ggtccctccc
 cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
 tgcgctagaa aatctattca agaacaccaa cgtaaccct aaagatatag
 gtatacttgt ggtgaactca agcatgttta atccaactcc atcgtctctc
 gcgatggctg ttaacacttt caagctccga agcaacgtaa gaagctttaa
 ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
 aggacttggt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
 gagaacatca cttataacat ttacgtctgt gataataggt ccatgatggg
 ttcaaattgc ttggtccgtg ttggtggggc cgctattttg ctctccaaca
 agcctggaga tcgtagacgg tccaagtacg agctagtcca cacggttcga
 acgcataacc gagctgac**ga** caagtctttt cgttgctgctg aacaaggaga
 cgatgagaac ggcaaaatcg gagtgaagtt gtccaaggac ataaccgatg
 ttgctggctg aacgggttaag aaaaacatag caacggtggg tccggttgatt
 cttccgttaa gcgagaaact tctttttttc gttaccttca tgggcaagaa
 acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
 ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
 ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
 aacgttacat agatttgtaa acacttcac tagctcaata tggatatgagt
 tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttgg
 cagattgctt tagggtcagg ctttaagtgt aacagtgcag tttgggtggc
 tctaaacaat gtcaaagctt cgacaaatag tccttgggaa cactgcatcg
 acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
 gtccaaaacg gtcggtccta a

FIGURE 2-11

At254 (SEQ ID NO:23)

atgacgtccg ttaacgttaa gtccttttac cgttacgtct taaccaactt
 tttcaacctc tgtttggtcc cgtaacggc gttcctcgcc ggaaaagcct
 ctcggttac cataaacgat ctccacaacc tcctttccta tctccaacac
 aaccttataa cagtaacttt actctttgct ttcactgttt tcggtttggt
 tctctacatc gtaacccgac ccaatccggt ttatctcggt gactactcgt
 gttaccttcc accaccgcat ctcaaagtta gtgtctctaa agtcatggat
 attttctacc aaataagaaa agctgatact tcttcacgga acgtggcatg
 tgatgatccg tctcgctcg atttcctgag gaagattcaa gagcgttcag
 gtctaggtga tgagacgtac agtctgagg gactcattca cgtaccaccg
 cggaagactt ttgcagcgtc acgtgaagag acagagaagg ttatcatcgg
 tgcgctcgaa aatctattcg agaacacca agttaaccct agagagattg
 gtatacttgt ggtgaactca agcatgttta atccaactcc ttcgctatcc
 gctatggctg ttaatacttt caagctccga agcaacatca aaagctttaa
 tctaggagga atgggttgta gtgctggtgt tattgccatt gatttggtta
 aagacttggt gcatgttcat aaaaacactt atgctctcgt ggtgagcaca
 gagaacatca cttataacat ttacgtcgtt gataataggt ccatgatggt
 ttcaaattgc ttgttccgtg ttggtggggc cgctattttg ctctccaaca
 agcctggaga tcgtagacgg tccaagtacg agctagtcca cacggttcga
 acgcataccg gagctgacgg caagtctttt cgttgcgtgc aacaaggaga
 cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
 ttgctggctg aacgggttaag aaaaacatag caacgttggg tccgttgatt
 cttccgttaa gcgagaaaact tctttttttc gttaccttca tgggcaagaa
 acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
 ctattgacca tttttgtata catgcggag gcagagccgt gattgatgtg
 ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
 aacgttacat agatttgga acacttcac tagctcaata tggatatgagt
 tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttg
 cagattgctt tagggtcagg cttaagtgt aacagtgcag tttgggtggc
 tctaaacaat gtcaaagctt cgacaaatag tccttgggaa cactgcacg
 acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
 gtcccaaacc gtcggtccta a

FIGURE 2-12

At173 (SEQ ID NO:25)

atgacgtccg ttaacgttaa gtccttttac cgttacgtct taaccaactt
 tttcaacctc tgtttggtcc cgtaacggc gttcctcgcc ggaaaagcct
 ctgggttac cataaacgat ctccacaact tcctttccta tctccaacac
 aaccttataa cagtaacttt actctttgct ttcactgttt tcggtttggt
 tctctacatc gtaaccgcac ccaatccggt ttatctcggt gactactcgt
 gttaccttcc accaccgcat ctcaaagtta gtgtctctaa agtcatggat
 attttctacc aaataagaaa agctgatact tcttcacgga acgtggcatg
 tgatgatccg tcctcgctcg atttcctgag gaagattcaa gagcggtcag
 gtctaggtga tgagacgtac agtcctgagg gactcattca cgtaccaccg
 cggaagactt ttgcagcgct acgtgaagag acagagaagg ttatcatcgg
 tgcgctcgaa aatctattca agaacaccaa cgtaaacctt aaagatatag
 gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
 gcgatggctg ttaacacttt caagctccga agcaacgtaa gaagctttaa
 ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
 aggacttgtt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
 gagaacatca cttataacat ttacgctggt gataataggt ccatgatggt
 ttcaaattgc ttggtccgtg ttggtggggc cgctattttg ctctccaaca
 agcctggaga tcgtagacgg tccaagtacg agctagttca cacgggtcga
 acgcataccg gagctgacgg caagtctttt cgttgctgct aacaaggaga
 cgatgagaac ggcaaaatcg gagtgaagtt gtccaaggac ataaccgatg
 ttgctggctg aacgggttaag aaaaacatag caacggttggg tccgttgatt
 cttccgttaa gcgagaaact tctttttttc gttaccttca tgggcaagaa
 acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
 ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
 ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
 aacgttacat agatttgga acacttcac tagctcaata tgggatgagt
 tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttgg
 cagattgctt tagggtcagg ctttaagtgt aacagtgcag tttgggtggc
 tctaaacaat gtcaaagctt cgacaaatag tccttgggaa cactgcatcg
 acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
 gtccaaaacg gtcggtccta a

FIGURE 2-13

Bn176 (SEQ ID NO:27)

atgacgtcca ttaacgtaaa gctcctttac cattacgtca taaccaacct
 tttcaacctt tgcttctttc cgtaaacggc gatcgtcgcc ggaaaagcct
 atcggttac catagacgat cttcaccact tatactattc ctatctccaa
 cacaaccta taaccatcgc tccactcttt gccttcaccg ttttcgggtc
 gggttctctac atcgcaaccc ggcccaaacc ggtttacctc gttgagtact
 catgctacct tccaccaacg cattgtagat caagtatctc caaggctcatg
 gatatctttt atcaagtaag aaaagctgat ccttctcgga acggcacgtg
 cgatgactcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
 gtctaggcga tgaaactcac gggcccgagg ggctgcttca ggtccctccc
 cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
 tgcgctagaa aatctattca agaaccacaa agttaaccct agagagattg
gtatacttgt ggtgaactca agcatgttta atccaactcc ttcgctatcc
gctatgggtcg ttaatacttt caagctccga agcaacatca aaagctttaa
tctaggagga atgggttgta gtgctgggtg tattgccatt gatttggcta
aagacttggt gcatgttcat aaaaacactt atgctcttgt ggtgagcact
gagaacatca cacaaggcat ttatgctgga gaaaatagat caatgatggt
tagcaattgc ttgtttcgtg ttgggtggggc cgcgattttg ctctctaaca
agtcggggaga cgggagacgg tccaagtaca agctagtcca cacggtccga
acgcatactg gagctgatga caagtctttt cgatgtgtgc aacaagaaga
tgatgagagc ggcaaaatcg gagtttgtct gtcaaaggac ataaccaatg
ttgcggggac aacacttacg aaaaatatag caacattggg tccgttgatt
cttcctttta gcgaaaagtt tctttttttc gctaccttcg tcgccaagaa
acttctaaag gataaaatca agcattacta tgttccggat ttcaagcttg
ctgttgacca tttctgtatt catgccggag gcagagccgt gatcgatgag
ctagagaaga acttaggact atcgccgatc gatgtggagg catctagatc
aacgttacat agatttgga atacttcac tagctcaatt tggatatgaat
tagcatacat agaggcaaag ggaagaatga agaaagggaa taaagcttgg
cagattgctt taggatcagg gtttaagtgt aatagtgcgg tttgggtggc
tctacgcaat gtcaaggcat cggcaaata tagcttgcaa cattgcatcg
atagatatcc ggttaaaatt gattctgatt tgtcaaagtc aaagactcat
gtccaaaacg gtcggtccta a

FIGURE 2-14

At399 (SEQ ID NO:29)

atgacgtccg ttaacgttaa gtccttttac cgttacgtct taaccaactt
 tttcaacctc tgtttggtcc cgtaacggc gttcctcgcc ggaaaagcct
 ctgggttac cataaacgat ctccacaact tcctttccta tctccaacac
 aaccttataa cagtaacttt actctttgct ttcactgttt tcggtttggt
 tctctacatc gtaacccgac ccaatccggt ttatctcggt gactactcgt
 gttaccttcc accaccgcat ctcaaagtta gtgtctctaa agtcatggat
 attttctacc aaataagaaa agctgatact tcttcacgga acgtggcatg
 tgatgatccg tcctcgctcg atttcctgag gaagattcaa gagcggtcag
 gtctaggtga tgagacgtac agtcctgagg gactcattca cgtaccaccg
 cggaagactt ttgcagcgtc acgtgaagag acagagaagg ttatcatcgg
 tgcgctcgaa aatctattcg agaacaccaa agttaaccct agagagattg
 gtatacttgt ggtgaactca agcatgttta atccaactcc ttcgctatcc
 gctatggctg ttaatacttt caagctccga agcaacatca aaagctttaa
 tctaggagga atgggttgta gtgctggtgt tattgccatt gatttggtca
 aagacttggt gcatgttcat aaaaacactt atgctcttgt ggtgagcact
 gagaacatca cacaaggcat ttatgctgga gaaaatagat caatgatggg
 tagcaattgc ttgtttcgtg ttgggtggggc cgcgattttg ctctctaaca
 agtcggggaga cgggagacgg tccaagtaca agctagttca cacgggtccga
 acgcatactg gagctgatga caagtctttt cgatgtgtgc aacaagaaga
 cgatgagagc ggcaaaatcg gagtttgtct gtcaaaggac ataaccaatg
 ttgcgggggac aacacttacg aaaaatatag caacattggg tccgttgatt
 cttcctttaa gcgaaaagtt tctttttttc gctaccttcg tcgccaagaa
 acttctaaag gataaaatca agcattacta tgttccggat ttcaagcttg
 ctgttgacca tttctgtatt catgccggag gcagagccgt gatcgatgtg
 ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
 aacgttacat agatttgga acacttcac tagctcaata tgggtatgagt
 tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttgg
 cagattgctt tagggtcagg cttaaagtgt aacagtgcag tttgggtggc
 tctaaacaat gtcaaagctt cgacaaatag tccttgggaa cactgcatcg
 acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
 gtccaaaacg gtcggtccta a

FIGURE 2-15

Bn399 (SEQ ID NO:31)

atgacgtcca ttaacgttaa gctcctttac cattacgtca taaccaacct
 tttcaacctt tgcttctttc cggttaacggc gatcgtcgcc ggaaaagcct
 atcggcttac catagacgat cttcaccact tatactattc ctatctccaa
 cacaacctca taaccatcgc tccactcttt gccttcaccg ttttcggttc
 ggttctctac atcgcaaccc ggcccaaacc ggtttacctc gttgagtact
 catgctacct tccaccaacg cattgtagat caagtatctc caaggatcatg
 gatatctttt atcaagtaag aaaagctgat ctttctcgga acggcacgtg
 cgatgactcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
 gtctaggcga tgaaactcac gggcccgagg ggctgcttca ggtccctccc
 cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
 tgcgctagaa aatctattca agaacaccaa cgttaaccct aaagatatag
 gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
 gcgatggctg ttaacacttt caagctccga agcaacgtaa gaagctttaa
 ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
 aggacttgtt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
 gagaacatca cttataacat ttacgctggt gataatagggt ccatgatggt
 ttcaaattgc ttgttccgtg ttggtggggc cgctattttg ctctccaaca
 agcctggaga tcgtagacgg tccaagtacg agctagttca cacggttcga
 acgcataaccg gagctgacgg caagtctttt cgttgcgtgc aacaaggaga
 cgatgagaac ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
 ttgctggctg aacgggttaag aaaaacatag caacggtggg tccgttgatt
 cttccgttaa gcgagaaact tctttttttc gttaccttca tgggcaagaa
 acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
 ctattgacca tttttgtata catgccggag gcagagccgt gatcgatgag
 ctagagaaga acttaggact atcgccgatc gatgtggagg catctagatc
 aacgttacat agatttggga atacttcac tagctcaatt tggtatgaat
 tagcatacat agaggcaaag ggaagaatga agaaagggaa taaagcttgg
 cagattgctt taggatcagg gtttaagtgt aatagtgcgg tttgggtggc
 tctacgcaat gtcaaggcat cggcaaata tagcttgcaa cattgcatcg
 atagatatcc ggttaaaatt gattctgatt tgtcaaagtc aaagactcat
 gtccaaaacg gtcggtccta a

FIGURE 2-16

Bn G307D (SEQ ID NO:33)

atgacgtcca	ttaacgtaaa	gctcctttac	cattacgtca	taaccaacct
tttcaacctt	tgcttccttc	cgttaacggc	gatcgtcgcc	ggaaaagcct
atcggccttac	catagacgat	cttcaccact	tatactattc	ctatctccaa
cacaacctca	taaccatcgc	tccactcttt	gccttcaccg	ttttcgggtc
ggttctctac	atcgcaaccc	ggcccaaacc	ggtttacctc	gttgagtact
catgctacct	tccaccaacg	cattgtagat	caagtatctc	caaggctcatg
gatatctttt	atcaagtaag	aaaagctgat	ccttctcgga	acggcacgtg
cgatgactcg	tcgtggcctg	acttcttgag	gaagattcaa	gaacgttcag
gtctaggcga	tgaaactcac	gggcccgagg	ggctgcttca	ggtcctccc
cgggaagactt	ttgcggcggc	gcgtgaagag	acggagcaag	ttatcattgg
tgcgctagaa	aatctattca	agaacaccaa	cgttaacctc	aaagatatag
gtatacttgt	ggtgaactca	agcatgttta	atccaactcc	atcgctctcc
gcgatggtcg	ttaacacttt	caagctccga	agcaacgtaa	gaagctttaa
ccttggtggc	atgggttgta	gtgccggcgt	tatagccatt	gatctagcaa
aggacttggt	gcatgtccat	aaaaatacgt	atgctcttgt	ggtgagcaca
gagaacatca	cttataacat	ttacgctggt	gataataggt	ccatgatggt
ttcaaatgct	ttgttcctgt	ttggtggggc	cgctattttg	ctctccaaca
agcctggaga	tcgtagacgg	tccaagtacg	agctagttca	cacggttcga
acgcataccg	gagctgacga	caagtctttt	cgttgcgtgc	aacaaggaga
cgatgagaac	ggcaaaatcg	gagtgaagtt	gtccaaggac	ataaccgatg
ttgctggtcg	aacgggttaag	aaaaacatag	caacgttggg	tccgttgatt
cttccgttaa	gcgagaaact	tctttttttc	gttaccttca	tgggcaagaa
acttttcaaa	gataaaatca	aacattacta	cgtcccggat	ttcaaacttg
ctattgacca	tttttgata	catgccggag	gcagagccgt	gattgatgtg
ctagagaaga	acctagccct	agcaccgatc	gatgtagagg	catcaagatc
aacgttacat	agatttgga	acacttcac	tagctcaata	tggtatgagt
tggcatacat	agaagcaaaa	ggaaggatga	agaaaggtaa	taaagtttgg
cagattgctt	tagggtcagg	ctttaagtgt	aacagtgcag	tttgggtggc
tctaaacaat	gtcaaagctt	cgacaaatag	tccttgggaa	cactgcatcg
acagataccc	ggtcaaaatt	gattctgatt	caggtaagtc	agagactcgt
gtccaaaacg	gtcggtccta	ataa		

FIGURE 2-17

At K92R (SEQ ID NO:35)

atgacgtccg ttaacgttaa gtccttttac cgttacgtct taaccaactt
 tttcaacctc tgtttgttcc cgttaacggc gttcctcgcc ggaaaagcct
 ctcggttac cataaacgat ctccacaact tcctttccta tctccaacac
 aaccttataa cagtaacttt actctttgct ttcactgttt tgggtttggt
 tctctacatc gtaacccgac ccaatccggt ttatctcggt gactactcgt
 gttaccttcc accaccgcat ctca**gag**gtta gtgtctctaa agtcatggat
 atttctacc aaataagaaa agctgatact tcttcacgga acgtggcatg
 tgatgatccg tcctcgctcg atttcctgag gaagattcaa gagcgttcag
 gtctaggtga tgagacgtac agtcctgagg gactcattca cgtaccaccg
 cggaagactt ttgcagcgtc acgtgaagag acagagaagg ttatcatcgg
 tgcgctcgaa aatctattcg agaacaccaa agttaaccct agagagattg
 gtatacttgt ggtgaactca agcatgttta atccaactcc ttcgctatcc
 gctatggctg ttaatacttt caagctccga agcaacatca aaagctttaa
 tctaggagga atgggttgta gtgctgggtg tattgccatt gatttggcta
 aagacttggt gcatgttcat aaaaacactt atgctcttgt ggtgagcact
 gagaacatca cacaaggcat ttatgctgga gaaaatagat caatgatggt
 tagcaattgc ttgtttcgtg ttggtggggc cgcgattttg ctctctaaca
 agtcggggaga cgggagacgg tccaagtaca agctagtcca cacgggtccga
 acgcatactg gagctgatga caagtctttt cgatgtgtgc aacaagaaga
 cgatgagagc ggcaaaatcg gagtttgtct gtcaaaggac ataaccaatg
 ttgcgggggac aacacttacg aaaaatatag caacattggg tccgttgatt
 cttcctttta gcgaaaagtt tctttttttc gctaccttcg tcgccaagaa
 acttctaaag gataaaatca agcattacta tggtccggat ttcaagcttg
 ctggtgacca tttctgtatt catgccggag gcagagccgt gatcgatgag
 ctagagaaga acttaggact atcgccgatc gatgtggagg catctagatc
 aacgttacat agatttggga atacttcac tagctcaatt tgggtatgaat
 tagcatacat agaggcaaag ggaagaatga agaaagggaa taaagcttgg
 cagattgctt taggatcagg gtttaagtgt aatagtgcgg tttgggtggc
 tctacgcaat gtcaaggcat cggcaaatag tccttgga caattgcatc
 atagatatcc ggttaaaatt gattctgatt tgtcaaagtc aaagactcat
 gtccaaaacg gtcggtccta atttgatgta tctgagtgcc aacgtttact
 ttgtctttcc tttcttttat tgggtatgaa ttagatgttt actaatgttc
 ctctcttttt cggtataaat aaagaagttc aattcttcct atagtttcaa
 acgcgatttt aagcgtttct atttaggttt acatgaattt cttttacaaa
 ccatctttt

FIGURE 2-18

At254 G307D (SEQ ID NO:37)

atgacgtccg ttaacgttaa gtccttttac cgttacgtct taaccaactt
 tttcaacctc tgtttgttcc cgtaaacggc gttcctcgcc ggaaaagcct
 ctoggcttac cataaacgat ctccacaact tcctttccta tctccaacac
 aaccttataa cagtaacttt actcttttgct ttcactgttt tcggtttggt
 tctctacatc gtaacccgac ccaatccggt ttatctcggt gactactcgt
 gttaccttcc accaccgcat ctcaaagtta gtgtctctaa agtcatggat
 attttctacc aaataagaaa agctgatact tcttcacgga acgtggcatg
 tgatgatccg tcctcgctcg atttcctgag gaagattcaa gagcggtcag
 gtctaggtga tgagacgtac agtcctgagg gactcattca cgtaccaccg
 cggaagactt ttgcagcgtc acgtgaagag acagagaagg ttatcatcgg
 tgcgctcgaa aatctattcg agaacaccaa agttaaccct agagagattg
 gtatacttgt ggtgaactca agcatgttta atccaactcc ttcgctatcc
 gctatggctg ttaatacttt caagctccga agcaacatca aaagctttaa
 tctaggagga atgggttgta gtgctggtgt tattgccatt gatttggtta
 aagacttggt gcatgttcat aaaaacactt atgctctcgt ggtgagcaca
 gagaacatca cttataacat ttacgctggt gataataggt ccatgatggt
 ttcaaattgc ttgttccgtg ttggtggggc cgctattttg ctctccaaca
 agcctggaga tcgtagacgg tccaagtacg agctagttca cacggttcga
 acgcataacc gagctgacga **ca**agtcctttt cgttgcgtgc aacaaggaga
 cgatgagaac ggcaaaatcg gagtgaagttt gtccaaggac ataaccgatg
 ttgctggctg aacgggttaag aaaaacatag caacggtggg tccgttgatt
 cttccgttaa gcgagaaact tctttttttc gttaccttca tgggcaagaa
 acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
 ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
 ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
 aacgttacat agatttgga aacattcatc tagctcaata tggatgatgt
 tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttgg
 cagattgctt tagggtcagg cttaaagtgt aacagtgcag tttgggtggc
 tctaaacaat gtcaaagctt cgacaaatag tccttgggaa cactgcatcg
 acagataccc ggtcaaaatt gattctgatt caggttaagtc agagactcgt
 gtccaaaacg gtcggtccta a

FIGURE 2-19

At173 G307D (SEQ ID NO:39)

atgacgtccg ttaacgttaa gctcctttac cgttacgtct taaccaactt
 tttcaacctc tgtttggtcc cgtaacggc gttcctcgcc ggaaaagcct
 ctcggttac cataaacgat ctccacaact tcctttccta tctccaacac
 aaccttataa cagtaacttt actccttgct ttcactgttt tcggtttggt
 tctctacatc gtaacccgac ccaatccggt ttatctcgtt gactactcgt
 gttaccttcc accaccgat ctcaaagtta gtgtctctaa agtcatggat
 attttctacc aaataagaaa agctgatact tcttcacgga acgtggcatg
 tgatgatccg tctcgtcgcg atttctgag gaagattcaa gagcgttcag
 gtctaggtga tgagacgtac agtctgagg gactcattca cgtaccaccg
 cggaagactt ttgcagcgtc acgtgaagag acagagaagg ttatcatcgg
 tgcgctcgaa aatctattca agaacacca cgtaaccct aaagatatag
 gtatacttgt ggtgaactca agcatgttta atccaactcc atcgtctctc
 gcgatggtcg ttaacacttt caagctccga agcaacgtaa gaagctttaa
 ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
 aggacttgtt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
 gagaacatca cttataacat ttacgtcgtt gataataggt ccatgatggt
 ttcaaattgc ttgttccgtg ttggtggggc cgctattttg ctctccaaca
 agcctggaga tcgtagacgg tccaagtacg agctagttca cacggttcga
 acgcataccg gagctgacga caagtctttt cgttgcgtgc aacaaggaga
 cgatgagaac ggcaaaatcg gaggtagttt gtccaaggac ataaccgatg
 ttgctggtcg aacggttaag aaaaacatag caacgttggg tccgttgatt
 cttccgttaa gcgagaaact tctttttttc gttaccttca tgggcaagaa
 acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
 ctattgacca tttttgtata catgccggag gcagagccgt gattgatgtg
 ctagagaaga acctagccct agcaccgatc gatgtagagg catcaagatc
 aacggtacat agatttgtaa acacttcac tagctcaata tggatatgagt
 tggcatacat agaagcaaaa ggaaggatga agaaaggtaa taaagtttgg
 cagattgctt tagggtcagg ctttaagtgt aacagtgcag tttgggtggc
 tctaaacaat gtcaaagctt cgacaaatag tccttgggaa cactgcatcg
 acagataccc ggtcaaaatt gattctgatt caggtaagtc agagactcgt
 gtccaaaacg gtcggtccta a

FIGURE 2-20

Bn399 G307D (SEQ ID NO:41)

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atgacgtcca ttaacgttaa gtccttttac cattacgtca taaccaacct
tttcaacctt tgcttctttc cgtaaacggc gatcgtcgcc ggaaaagcct
atcggcttac catagacgat cttcaccact tatactattc ctatctccaa
cacaacctca taaccatcgc tccactcttt gccttcaccg ttttcggttc
ggttctctac atcgcaaccc ggcccaaacc ggtttacctc gttgagtact
catgctacct tccaccaacg cattgtagat caagtatctc caaggtcatg
gatatctttt atcaagtaag aaaagctgat ccttctcgga acggcacgtg
cgatgactcg tcgtggcttg acttcttgag gaagattcaa gaacgttcag
gtctaggcga tgaaactcac gggcccgagg ggctgcttca ggtccctccc
cggaagactt ttgcggcggc gcgtgaagag acggagcaag ttatcattgg
tgcgctagaa aatctattca agaacaccaa cgttaaccct aaagatatag
gtatacttgt ggtgaactca agcatgttta atccaactcc atcgctctcc
gcgatggctg ttaacacttt caagctccga agcaacgtaa gaagctttaa
ccttggtggc atgggttgta gtgccggcgt tatagccatt gatctagcaa
aggacttggt gcatgtccat aaaaatacgt atgctcttgt ggtgagcaca
gagaacatca cttataacat ttacgctggt gataataggt ccatgatggt
ttcaaattgc ttgttccgtg ttggtggggc cgctattttg ctctccaaca
agcctggaga tcgtagacgg tccaagtacg agctagtcca cacgggttcga
acgcataccg gagctgacga caagtccttt cgttgctgac aacaaggaga
cgatgagAAC ggcaaaatcg gagtgagttt gtccaaggac ataaccgatg
ttgctggctg aacgggttaag aaaaacatag caacgttggg tccgttgatt
cttccgttaa gcgagaaact tctttttttc gttaccttca tgggcaagaa
acttttcaaa gataaaatca aacattacta cgtcccggat ttcaaacttg
ctattgacca tttttgtata catgccggag gcagagccgt gatcgatgag
ctagagaaga acttaggact atcgccgatc gatgtggagg catctagatc
aacgttacat agatttgga atacttcac tagctcaatt tggatatgaat
tagcatacat agaggcaaag ggaagaatga agaaagggaa taaagcttgg
cagattgctt taggatcagg gtttaagtgt aatagtgcgg tttgggtggc
tctacgcaat gtcaaggcat cggcaaatag tccttggaac cattgcatcg
atagatatcc ggttaaaatt gattctgatt tgtcaaagtc aaagactcat
gtccaaaacg gtcggtccta a

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FIGURE 2-21